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TO: Wayne Hedberg, Mineral Program Supervisor

FROM: Holland Shepherd, Reclamation Soils and Biological Specialist HJS

RE: Review of Escalante Mine Tailings Pond Reclamation Pond, Hecla Mining Company, M/021/004, Iron County, Utah

R613-004-110(5) - Reclamation Plan - Seeding

The operator has not provided a seed mix for the tailings pond reclamation, though one is provided for the barrow sites. In developing any seed mix for the tailings site, shrubs need to be omitted. They are deep rooting and would have a detrimental effect on the clay liner. Shrubs will eventually invade onto the site, but their invasion will be inhibited by a well established stand of grasses and forbs.

A good seed mix can be obtained by using the same seed mix provided on page 24 of the plan, but omit the shrubs. Also, it will be necessary to increase individual rates of seed application of grass and forb species, to achieve 14 lbs/ac or greater. Crested wheatgrass can be left in but I would reduce the rate to 1 lb/ac, and add riparian wheatgrass and western wheatgrass at 2 lb/ac each. Also, Indian ricegrass should be added to the mixture. The mixture should include the following:

Species	lb/ac PLS *
Grasses	
Bottlebrush squirrel tail	0.5
Needle and thread	0.5
Crested wheatgrass	1.0
Riparian wheatgrass	2.0
Western wheatgrass	2.0
Indian ricegrass	2.0
Russian wildrye	1.0

Forbs	
Lewis flax	0.5
Palmer penstemon	1.0
Yellow sweetclover	2.0
Alfalfa	1.0
Gooseberry & or Goldenmallow	1.0
Small burnet	1.0
Total	15.5

*These rates are for drill seeding only. The rates need to be increased if seeds are to be broadcast.

R613-004-110(5) - Reclamation - Seed Bed Preparation

1. The plan indicates that topsoil will be salvaged and replaced over barrow areas, then reseeded. The plan (barrow area reclamation) does not discuss whether amendments will be added to the soil material or not, or the depth of soil reapplication. These specifications must be developed further by the operator. The Division recommends 1 foot of topsoil reapplication and either fertilizing or incorporating in a hay mulch at 3,000 lbs/ac.

2. The plan calls for a rooting medium of approximately 18 inches over the tailing material. This depth should be sufficient for grasses and forbs during normal years of precipitation. However, the depth will be insufficient for shrubs which require deeper rooting depths. The resulting plant community over the reclaimed tailings pond will be predominantly grass. This will no doubt be sufficient except during draught years when shrubs are the best survivors. There will be a potential, if the climate continues to be draught prone, that the vegetative success over the pond will be poor especially if the area is eventually open to grazing. Removal of the plant cover may eventually expose the tailings, again creating a dust problem.

The tailings, themselves, can never be considered part of the rooting medium, because of their deleterious nature, thus the rooting depth will remain permanently at 18 inches. The problem of too shallow a rooting medium can be resolved by increasing the depth of material spread over the tailings. A deeper planting medium would resolve three problems that may develop in association with the pond reclamation: 1. providing a adequate rooting depth for plants; 2. limit the amount of moisture which might eventually infiltrate into the tailings and thus create a bathtub effect or leachate soup; and 3. help prevent plant root damage to the clay liner by suspending plants higher over the liner.

We need to decide what we are willing to accept in this situation, a shallow, less expensive cap, which has a greater potential for failure, or a deeper cap that will be more expensive but reduce the potential for failure substantially more. It is possible that some type of compromise on the reclamation of the pond could be achieved with State Health if they would feel more comfortable with a deeper cap.

jb
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